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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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12/03/2001

David G. Steer

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10/12/2006

SMART & BIGGAR

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CANADA

EXAMINER

JAGANNATHAN, MELANIE

ART UNIT

PAPER NUMBER

2616

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/998,193

Applicant(s)

STEER ET AL.

Examiner

Melanie Jagannathan

Art Unit

2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on interview on 7/31/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 12-14 and 18-33 is/are rejected.
- 7) ☒ Claim(s) 2-11, 15-17 and 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

- Examiner has withdrawn finality of rejection mailed 5/31/2006.
- Claims 1-34 are pending.

Claim Objections

1. Claims 30, 32 and 34 are objected to because of the following informalities:
Claims include "adapted to" language which suggests or makes optional but does not require the particular steps to be performed in the above claims. Subsequently, the claims raise a question as to the limiting effect of the language. Please see MPEP 2111.04. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 12-14, 18-21, 22-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bourlas et al. US 6,459,687 in view of Pollack et al. US 6,192,026.

Regarding claim 1, the claimed receiving, at a device, a received signal that includes a remotely transmitted signal, where remotely transmitted signal is in a given frequency band and the claimed transmitting, concurrent with receiving, a locally transmitted signal in given frequency band, where locally transmitted signal is substantially orthogonal to remotely transmitted signal is disclosed by frequency division duplexing system where customer premise equipment (Figure 1, element 110) and base station (Figure 1, element 104) both receive and transmit at the same time. See column 1, lines 47-52 and column 6, lines 58-63.

Bourlas et al. discloses all of the limitations except for the signals being substantially orthogonal. Pollack et al. discloses OFDM signals transmitted and received between the access point and the data communication devices in a wireless system. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify signals of Bourlas et al's wireless system utilizing MAC with orthogonal signals in wireless MAC system of Pollack et al. One of ordinary skill in the art would be motivated to do so to reduce interference between signals.

Regarding claims 30-33, the claimed apparatus comprising receiver to received signal that includes a remotely transmitted signal, where remotely transmitted signal is

in a given frequency band and a transmitter concurrent with receiving, a locally transmitted signal in given frequency band, where locally transmitted signal is substantially orthogonal to remotely transmitted signal is disclosed by frequency division duplexing system where customer premise equipment (Figure 1, element 110) and base station (Figure 1, element 104) both receive and transmit at the same time. See column 1, lines 47-52 and column 6, lines 58-63. The base station and customer premise equipment, communicating used FDD, share the frequency band and base station communicates using a downlink subframe on a first channel and customer premise equipment uses an uplink subframe on a second channel transmitted simultaneously during the same predetermined period.

Bourlas et al. discloses all of the limitations except for the signals being substantially orthogonal. Pollack et al. discloses OFDM signals transmitted and received between the access point and the data communication devices in a wireless system. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify signals of Bourlas et al's wireless system utilizing MAC with orthogonal signals in wireless MAC system of Pollack et al. One of ordinary skill in the art would be motivated to do so to reduce interference between signals.

Regarding claim 21, the claimed communications channel is wireless channel is disclosed by Bourlas et al. by broadband wireless system including base stations (Figure 1, element 106) and multiple customer premise equipments (element 110) employing FDD. See column 1, lines 35-67, column 2, line 1.

Regarding claims 12-14, Bourlas et al. discloses all of the limitations except for the claimed generating an error signal from locally transmitted signal, attenuating error signal and subtracting error signal from received signal to suppress elements of locally transmitted signal in received signal and developing composite of multiple attenuated and phase-shifted copies of locally transmitted signal. Pollack et al. discloses the receiver captures signal, is fed into FFT to produce a received frequency spectrum. A symbol detection stage (Figure 3, element 316) corrects each point in received frequency-domain sequence for channel's amplitude scaling and phase shift at that frequency. The channel estimation circuit (element 318) uses training tones embedded in each burst to recover complex scalars for each of the 256 frequencies. Using the same bits-to-symbol mapping as transmitter, output bits are produced by bit mapper (element 320). See column 5, lines 64-67, column 6, lines 1-21. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Bourlas et al. with the error correction of Pollack et al. One of ordinary skill in the art would for proper reception and processing of signal.

Regarding claims 18-19, Bourlas et al. discloses all of the limitations except for the claimed remotely transmitted is encoded using a first code and encoding locally transmitted using second code, second code is substantially orthogonal to first code. Pollack et al. discloses an OFDM system where the tones within burst are substantially independent from one another. See column 8, lines 65-67, column 9, lines 1-14. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify signals of Bourlas et al's wireless system utilizing MAC with orthogonal

signals in wireless MAC system of Pollack et al. One of ordinary skill in the art would be motivated to do so to reduce interference between signals.

Regarding claims 22-26, 28, Bourlas et al. discloses all of the limitations except for the claimed estimating characteristics of channel in given frequency band based on received signal, adjusting transmitting based on estimating characteristics, obtaining a Fourier transform of received signal, estimated characteristics based on FFT, recognizing pilot signal in FFT, adjusting a transmission power level, adjusting modulation technique, adjusting an antenna beam tracking technique. Pollack et al. discloses a receiver antenna captures signal, is fed into FFT to produce a received frequency spectrum. A symbol detection stage (Figure 3, element 316) corrects each point in received frequency-domain sequence for channel's amplitude scaling and phase shift at that frequency. The channel estimation circuit (element 318) uses training tones embedded in each burst to recover complex scalars for each of the 256 frequencies. Using the same bits-to-symbol mapping as transmitter, output bits are produced by bit mapper (element 320). See column 5, lines 64-67, column 6, lines 1-21. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Bourlas et al. with the error correction of Pollack et al. One of ordinary skill in the art would for proper reception and processing of signal.

Regarding claims 27,29, Bourlas et al. discloses all of the limitations except for the claimed adjusting transmitting comprising adjusting a space-time coding technique. Pollack et al. discloses cross-referenced Spatio-Temporal channel estimation. See column 6, lines 11-21. At the time the invention was made it would have been obvious

to a person of ordinary skill in the art to modify Bourlas et al. with the channel estimation of Pollack et al. One of ordinary skill in the art would for proper reception and processing of signal.

Regarding claim 20, Bourlas et al. and Pollack et al. disclose all of the limitations except for orthogonal spreading codes are based on Walsh functions. At the time the invention was made it would have been obvious to modify Bourlas et al. and Pollack et al.'s codes to be based on Walsh functions. One of ordinary skill in the art would be motivated to do so eliminate any inter-carrier interference.

Allowable Subject Matter

4. Claims 2-11, 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 34 would be allowable if rewritten to overcome the claim objection set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Regarding claim 2, prior art of record does not disclose, in single or in combination, the remotely transmitted signal has a first set of sub-carrier center frequencies, characterized by presence of signal, and a first set of zero signal frequencies, characterized by absence of signal and the locally transmitted signal having a second set of sub-carrier frequencies and second set of zero frequencies,

where second set of sub-carrier center frequencies correspond in frequency to first set of zero signal frequencies and second set of zero signal frequencies correspond to frequency to first set of sub-carrier center frequencies in combination with other limitations of the claim.

Regarding claim 5, prior art of record does not disclose, in single or in combination, the first set of sub-carrier center frequencies have odd indices and second set of sub-carrier center frequencies have even indices in combination with other limitations of claim.

Regarding claim 6, prior art of record, does not disclose, in single or in combination, determining a traffic ratio, amount of downlink traffic in locally transmitted signal to amount of uplink traffic in remotely transmitted signal, wherein a ratio of number of center frequencies in first set of sub-carrier frequencies to number of center frequencies in second set of sub-carrier frequencies is proportional to traffic ratio in combination with other limitations of claim.

Regarding claims 8-9, prior art of record does not disclose, in single or in combination, the claimed switching pseudo-random sets of candidate center frequencies to new sets such that new transmitter pseudo-random set of candidate of center frequencies is non-overlapping with a new receiver pseudo-random set of candidate of center frequencies and new sets follows a pseudo-random pattern known to transmitter in combination with other limitation of claims.

Regarding claim 10, prior art of record does not disclose, in single or in combination, determining from Fourier transform of received signal, frequency values of

first set of zero signal frequencies and adjusting second set of sub-carrier frequencies to correspond in frequency to first set of zero signal frequencies in combination with other limitation of claims.

Regarding claims 15-17, prior art of record does not disclose, in single or in combination, detecting an amount of locally transmitted signal in received signal and based on detecting, adjusting generating of error signal based on power levels to suppress elements of locally transmitted signal, obtaining a Fourier transform of received signal and from Fourier transform, determining power levels of second set of sub-carrier frequencies of in combination with other limitation of claims.

Regarding claim 34, prior art of record does not disclose, in single or in combination, re-allocating plurality of sub-carrier center frequencies to a new first subset and new second subset based on measuring of traffic flow from mobile terminal to base station and vice versa, and communicate identities of sub-carrier frequencies allocated to new first and second subsets to base station and mobile terminal in combination with other limitation of claims.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie Jagannathan whose telephone number is 571-272-3163. The examiner can normally be reached on Monday-Friday from 8:00 a.m.- 5:00 p.m.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham can be reached on 571-272-3179. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Melanie Jagannathan
Patent Examiner
Art Unit 2616
September 27, 2006


CHI PHAM
SUPERVISORY PATENT EXAMINER

